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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

WITHERSPOON, SIKARL A

ART UNIT	PAPER NUMBER
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1621

NOTIFICATION DATE	DELIVERY MODE
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11/26/2008

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/567,900	Applicant(s) KOJIMA ET AL.	
	Examiner Sikarl A. Witherspoon	Art Unit 1621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 August 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10, 12 and 13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10, 12 and 13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 February 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The examiner has considered the amendment and response filed August 14, 2008. The examiner has not found applicants' arguments persuasive; as such, the rejection made in the Office Action dated May 18, 2008 has been maintained. Newly added claims 12 and 13 are to be included with the previously rejected claims. The rejection has been copied below for applicants' convenience.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosono et al. (US 20060281944, US'944 equivalent to JP2004277297) in view of Scates et al. (US6303813, US'813 equivalent to JP2003508363) or Jones (US7098363, US'363 equivalent to

JP2002508759) all in IDS and ISR, further in view of and Miura et al. (EP0687662, EP'662 equivalent to US5625093 in ISR).

4. The instant claims are drawn to a method for producing acetic acid, comprising, *inter alia*, continuously reacting methanol with carbon monoxide in the presence of a rhodium catalyst, an iodide salt, methyl iodide, methyl acetate, and water; with the following method characteristics, which are, *inter alia*, a production rate of 11 mol/L.hr or more; the acetaldehyde content kept to 500 ppm or less, carbon monoxide partial pressure of 1.05 MPa or more, methyl acetate of reaction mixture of 2 percent by weight or more, production rate of acetaldehyde to production rate of acetic acid at 1/1500 or less, hydrogen partial pressure, *inter alia*, at 100kPa or less, water content of the reaction mixture of 3% by weight or less.

5. US'944 in [0012] teaches a method of making acetic acid by carbonylating methanol with CO by way of a heterogeneous catalytic reaction in a bubble column reactor. In the claims pp10-12, US'944 teaches that the CO partial pressure within the range of 1.0-2.5 MPa or preferably 1.7-2.2 Mpa; where acetic acid productivity decreases when the CO partial pressure is below 1.0 MPa. And in Table 1 page 9 and in the examples, CO partial pressure was run at 1.8mPa. In the claims, US'944 teaches the concentration of water.

6. US'944 differs from the instant claims in US'944 being silent regarding a) the methyl acetate content of the reaction mixture; b) the concentration of acetaldehyde.

7. For difference (a), US'813 is relied upon to teach that the concentration of methyl acetate to be 0.5-5.0 wt%, as well as the optimum water level and hydrogen partial pressure, in the carbonylation reaction mixture for stabilization and rate enhancement purposes (see Table I col6, Table II col9 and col6 lines 18-60).

8. US 363 is relied upon to teach the advantage of faster reaction rate for carboxylic acid production having methyl acetate concentrations of 20 wt% relative to 10wt% (see examples col6-8, particularly col7 lines10-15).

9. The difference (a) would have been obvious to one of ordinary skill in the art at the time of Applicants' invention, since methyl acetate is a by-product of the reaction.

10. The artisan would have been motivated to optimize the level of methyl acetate concentration, since the cited prior art has shown the stabilization effect and rate enhancement effect of methyl acetate concentration in the carbonylation reaction to make acetic acid; and the artisan would have reached a reasonable expectation of making acetic acid with the desired purity following the optimal concentrations found effective in his art.

11. For difference (b), the amount of acetaldehyde, EP'662 is relied upon to teach in page 20 claims 1-2, a process of producing a high purity acetic acid, comprising continuously reacting methanol with carbon monoxide in the presence of a rhodium catalyst, an iodide salt, and methyl iodide, wherein the reaction is carried out while maintaining *an acetaldehyde concentration* in the reaction liquid at 400 ppm or lower. In page 4 lines 37-39, EP'662 states that the water content is preferably 1 to 5 weight %. In page 4 lines 45-46, EP'662 states the partial pressure of carbon monoxide is preferably 4 to 15 atm. In lines 53-57 page 3, EP'662 discusses that the resulting reaction liquid of methanol with carbon monoxide in the presence of a rhodium catalyst, an iodide salt and methyl iodide is *separated* from the low volatile phase containing the rhodium catalyst, *distilling* the volatile phase to obtain a product mixture containing acetic acid and the overhead containing methyl acetate and methyl iodide, and *recirculating* said overhead into the reactor, wherein the overhead contains acetaldehyde and iodide. In page 2 lines 49-51,

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EP'662 discusses that the *ion-exchange resin* for treating the acetic acid is the partially converted *silver* form of a macro-reticulated strong acid cation exchange resin.

12. The remaining difference of acetaldehyde concentration is not patentable. It is not patentable because at the time of Applicants' invention was made, it would have been obvious to a person of ordinary skill in the art to utilize the process steps of US'944 with US'813 or US'363 since the carbonylation process of US'944 has the equivalent components of acetic acid, water, methyl acetate and methyl iodide, and catalyst system, inclusive of undesirable PRC's and other impurities.

13. One having ordinary skill in the art would have been motivated utilize the process steps of US'944 coupled with the other cited references since the carbonylation reactions to make acetic acid is improved when the CO partial pressure and methyl acetate concentration are within the instant ranges; and since the reaction conditions are equivalent, one of ordinary skill in the art can infer that the acetic acid reaction speed and concentrations are similar. The combination of the teachings of the cited prior art references show the components are separated efficaciously with an increased STY (space time yield) with impurities kept to the minimum, in the carbonylation process for the production of acetic acid and the artisan in optimizing his processes within the normal routine of adapting processes that work effectively, would expect a reasonable expectation of producing acetic acid with low acetaldehyde levels.

In applying known technique, such as optimizing CO partial pressure and/or methyl acetate content, to a known device (method, or product) ready for improvement to yield predictable results, the claim would have been obvious because a particular known technique was recognized as part of the ordinary capabilities of one skilled in the art.

The claims would have been obvious because "a person of ordinary skill has a good reason to pursue the known options within his or her technical group. If this leads to the anticipated success, it is likely the product, not of innovation, but of ordinary skill and common sense."

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14. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable as being unpatentable over Hosono et al. (US 20060281944, US'944 *equivalent to JP2004277297*) in view of Seates et al. (US6303813, US'813 *equivalent to JP2003508363*) or Jones (US7098363, US'363 *equivalent to JP2002508759*) *all in IDS and ISR*, further in view of and Miura et al. (EP0687662, EP'662 *equivalent to US5625095 in ISR*), as applied to claims 1-7 above, and further in view of Cheung et al. (US7005541, US'541)

15. Claims 1-8 are rejected in view of the cited prior art references cited as set forth above, and are included herein in their entirety.

16. The instant claims are drawn to a method for producing acetic acid, comprising, *inter alia*, continuously reacting methanol with carbon monoxide in the presence of a rhodium catalyst, an iodide salt, methyl iodide, methyl acetate, and water; with the following method characteristics, which are, *inter alia*, a production rate of 11 mol/L.hr or more; the acetaldehyde content kept to 500 ppm or less, carbon monoxide partial pressure of 1.05 MPa or more, methyl acetate of reaction mixture of 2 percent by weight or more, production rate of acetaldehyde to production rate of acetic acid at 1/1500 or less, hydrogen partial pressure, *inter alia*, at 100kPa or less, water content of the reaction mixture of 3% by weight or less. The instant claims include a purification process. The said purification step comprises the separation of the target acetic acid compound from the reaction by-products, treating the acetic acid with a silver- or mercury-exchanged *[sic]* resin, as well as the recovery and recycling of catalyst system and reactants reusable to augment virgin materials.

17. US'541, in column 6 lines 1- 67 continuing to columns 7-8 lines 1 68, teaches that in the carbonylation reaction to form acetic acid, the reaction mixture of methanol and carbon

monoxide is continuously fed to a reactor in which desired partial pressure of carbon monoxide is maintained, the accumulation and level of impurities or PRC's (permanganate reducing components, like acetaldehyde) are kept to a minimum; whereby the reaction mixture is separated into product acetic acid and lighter components of reaction mixture, the latter containing mostly acetic acid and catalyst may be recycled back to the reactor. Vapors from the flasher are fed to a splitter, where overhead vapors are condensed and separated into light aqueous phase and a heavy organic phase. The light aqueous phase contains water, acetic acid, methanol, methyl iodide and methyl acetate and some PRC's. The heavy organic phase contains mainly methyl iodide and methyl acetate, which may be recycled as is or after further processing. The light aqueous phase is typically used as reflux and *a portion recycled back to the reaction section*, where typically a first distillation column serves to separate the fraction of a lighter overhead comprising acetaldehyde, methyl iodide and methyl acetate from the heavier fraction comprising acetic acid and water which is *recycled to the purification section*. In lines 41-68 column 7, US'541 delineates the steps and components thereto, comprising *volatile and low-volatile components separated by at least two distillation steps, the volatile component comprising acetic acid, water, methyl acetate and methyl iodide, and the low-volatile component comprising the catalyst system and the PRC's (carbonyl impurities)* by step-wise illustration of the figure therein inclusive of the *distillation columns* and reference to *further processing steps*. US'541 teaches the acetic production rates of 15 g-mol/hr of less than 2.0% water, using rhodium or rhodium/iridium catalysts with methyl acetate (column 4 lines 48-53); where the methyl acetate levels are 1.0-30% (column 6 lines 18-23). US'541 teaches the continuous

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carbonylation process to comprise reaction, purification, and off-gas treatment sections (column 7 lines 41-43).

18. It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to further utilize a purification process to optimize the quality of the desired end product, including the recycle and reuse of unreacted materials.

19. The artisan would have been motivated to optimize the purity of his end-product, for quality purposes and recycle/reuse unreacted materials to defray capital costs and reach a reasonable expectation of making the desired acetic acid with excellent purity.

20. The combination of the teachings of the cited prior art references are fairly suggestive of the *prima facie* obviousness of the instant claims, as recited.

Response to Arguments

Applicant's arguments filed August 14, 2008 have been fully considered but they are not persuasive. With regard to Hosono et al (US '944) applicants argue that the claims as amendment require a homogeneous catalyst, while Hosono et al teach a heterogeneous catalyst, and therefore, Hosono et al constitutes a teaching away from the claimed invention. With regard to Scates et al (US '813), applicants argue that the low hydrogen partial pressure taught by Scates et al would make it difficult to achieve sufficient catalyst activity and therefore, it would have been impossible to achieve the claimed production rate of acetic acid while keeping the ratio of the production rate of acetaldehyde at the claimed rate. Regarding Jones (US '363) applicants again argue that the heterogeneous catalyst taught therein is a teaching away from the claimed

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invention. Applicants go on to argue the difference in reaction parameters of the remaining reference and why based on those teachings, the artisan would not have arrived at the claimed production rate of acetic acid while keeping the ratio of the production rate of acetaldehyde at the claimed rate.

The examiner does not find these arguments persuasive. First, Hosono et al teach a carbon monoxide partial pressure that meets the claim limitation and teaches that when the carbon monoxide partial pressure is below 1.0 MPa, the production of acetic acid decreases. Scates et al teach a homogeneous catalyst and teaches a methyl acetate content of the reaction mixture at a preferable range of 0.5 to 5 wt % for a stabilizing and rate enhancement effect. Jones et al was mentioned by the examiner as another teaching that the concentration of methyl acetate in the reaction mixture has an effect on the reaction rate for carboxylic acid production. Finally, Miura et al (US '662) was cited by the examiner as a general teaching that it is of benefit to keep the concentration of acetaldehyde in the reaction mixture low, specifically to 400 ppm or less, and also teaches a water concentration of 1 to 5 wt%.

The combination of reference teachings would have lead a person having ordinary skill in the art to the conclusion that this type of reaction for making acetic acid can be conducted using either a homogeneous catalyst or a heterogeneous catalyst and still expect acetic acid to be produced. The examiner contends that at the time of the present invention, a person having ordinary skill in the art would have been able to look to the combination of reference teachings and arrived at a process that would have employed a carbon monoxide partial pressure, hydrogen partial pressure, methyl

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acetate content, water content, production rate and concentration of acetaldehyde that may be contained in the reaction mixture, etc., that would have allowed such a person to derive the best possible reaction parameters for producing acetic acid efficiently. The instant claims appear to be a combination of art-recognized reaction parameters that when employed in unison would have had the obvious and desired effect of enhancing the production of acetic acid while keeping the formation of by-products and initiation of side reactions low. As such, the examiner contends that the rejection of record does indeed render the claimed invention prima facie obvious, since there is no claimed element or combination of elements that leads to results that a person having ordinary skill in the art would have found unexpected.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikarl A. Witherspoon whose telephone number is 571-272-0649. The examiner can normally be reached on M-F 8:30-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Daniel Sullivan can be reached on 571-272-0779. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sikarl A. Witherspoon/
Primary Examiner, Art Unit 1621